

We Claim:

1 1. A method for measuring a characteristic dimension of at least one pattern on a
2 disc-shaped object in a measuring instrument, the measurement instrument having a lens
3 system and a computing and control unit, the at least one pattern being formed in at least
4 one fabrication step and subsequently being checked by the measurement, comprising:
5 measuring at least one alignment mark for aligning the provided disc-shaped
6 object relative to the lens system of the measuring instrument;
7 measuring the at least one pattern in order to detect the at least one pattern on the
8 disc-shaped object;
9 measuring the at least one pattern in order to set the lens system to achieve a sharp
10 image of the at least one pattern; and
11 measuring the characteristic dimension of the at least one pattern, wherein at least
12 one of the measuring steps is assigned in each case a parameter and in each case a
13 computing rule for determining a value for the parameter, which represents the quality of
14 the measuring step respectively carried out, a limiting value is assigned to the parameter,
15 the computing and control unit applies the computing rule to calculate the value of the
16 parameter from the measured data obtained in the at least one measuring step, the
17 computing and control unit compares the calculated value of the parameter with the
18 assigned limiting value, and at least one of the fabrication steps required to form the
19 pattern is repeated for the disc-shaped object in the event of overshooting of at least one
20 of the limiting values.

1 2. The method according to claim 1, wherein the measuring instrument
2 comprises an optical microscope or scanning electron microscope.

1 3. The method according to claim 2, wherein for each of the measuring steps,
2 the parameter is calculated in each case and compared with the respective limiting value.

1 4. The method according to claim 1, wherein in the case of a plurality of
2 parameters, the computing and control unit calculates one quality parameter the quality
3 parameter representing the quality of the measurement from the calculated parameters, the
4 quality parameter being compared with a prescribed quality limiting value, a warning
5 signal being generated as a function of the comparison.

1 5. The method according to claim 3, wherein for the measuring step of the
2 alignment, the measured data obtained in this measuring step includes a digital image, the
3 computing rule for calculating the value of the relevant parameter includes the
4 comparison of the digital image with a reference image.

1 6. The method according to claim 3, wherein for the measuring step of the
2 detection of the at least one pattern, the measured data obtained includes a digital image,
3 the computing rule for calculating the value of the relevant parameter includes the
4 comparison of the digital image with a reference image.

1 7. The method according to claim 3, wherein for the measuring step of aligning
2 the lens system, the measured data obtained includes a measuring curve, the computing
3 rule for calculating the value of the parameter relating to the measuring step includes the
4 comparison of the measuring curve with a reference curve.

1 8. The method according to claim 3, wherein the measuring step of the
2 characteristic dimension is carried out with the aid of at least two measurements of the at
3 least one pattern, the computing rule of the parameter relating to the pattern width
4 measuring step includes the comparison of a first measuring curve of a first measurement
5 with a second measuring curve of a second measurement.

1 9. The method according to claim 1, wherein the disc-shaped object is a
2 semiconductor wafer, a mask, or a reticule or a flat panel display.

1 10. The method according to claim 1, wherein the measuring step is repeated for
2 a multiplicity of disc-shaped objects, the value of the parameter for the respective
3 measuring step is stored in a database, and a trend analysis is carried out for the parameter
4 over the multiplicity of the respectively stored values.

1 11. The method according to claim 4, wherein for the measuring step of the
2 alignment, the measured data obtained in this measuring step includes a digital image, the

3 computing rule for calculating the value of the relevant parameter includes the
4 comparison of the digital image with a reference image.

1 12. The method according to claim 4, wherein for the measuring step of the
2 detection of the at least one pattern, the measured data obtained includes a digital image,
3 the computing rule for calculating the value of the relevant parameter includes the
4 comparison of the digital image with a reference image.

1 13. The method according to claim 4, wherein for the measuring step of aligning
2 the lens system, the measured data obtained includes a measuring curve, the computing
3 rule for calculating the value of the parameter relating to the measuring step includes the
4 comparison of the measuring curve with a reference curve.

1 14. The method according to claim 4, wherein the measuring step of the
2 characteristic dimension is carried out with the aid of at least two measurements of the at
3 least one pattern, the computing rule of the parameter relating to the pattern width
4 measuring step includes the comparison of a first measuring curve of a first measurement
5 with a second measuring curve of a second measurement.